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Research Paper

A Randomized Controlled Double Blind Study to Compare Dexmedetomidine 5 µg and 10 µg as an Adjuvant to Intrathecal Bupivacaine

Medical Science

KEYWORDS : Dexmedetomidine, intrathecal, Bromage.

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ABSTRACT

Objective- This study was designed to compare the effect of two doses of dexmedetomidine [5mcg and 10 mcg] on onset and duration of sensory and motor block of hyperbaric bupivacaine when given intrathecally.
Methods- Study was conducted in 52 ASA I/II patients posted for lower abdominal surgeries under subarachnoid block. Patients were divided in two groups of 26 patients each. Group 1 and group 2patients received 5mcg and 10 mcg dexmedetomidine respectively with 12.5 mg bupivacaine heavy intrathecally. Onset and duration of sensory and motor block was assessed.
Result- Dexmedetomidine reduced onset and prolonged the duration of sensory and motor block of hyperbaric bupivacaine .No significant side effect or haemodynamic instability noted in either group.
Conclusion- Dexmedetomidine is good alternative as an adjuvant to intrathecal bupivacaine in surgical procedures that require long time with minimal side effects.

INTRODUCTION

Over the last few decades there has been drastic improvement in the regional anesthetic techniques. Use of intrathecal adjuvant has gained popularity in recent years. Extensive experimentation is going on in this field with the aim of prolonging duration of sensory block providing better postoperative analgesia with minimal side effects. Dexmedetomidine is highly selective α_2 agonist. Based on earlier studied, it is hypothesized that when dexmedetomidine is added to intrathecal bupivacaine, the duration of sensory and motor block is prolonged.[1,2]

This study was carried out to evaluate and compare the effect of two doses of dexmedetomidine (5µg. and 10µg) on onset and duration of sensory and motor block of hyperbaric bupivacaine.

Material and METHOD

This prospective randomized double blind study was carried out in 52 patients posted for lower abdominal surgery under subarachnoid block at the Department of Anaesthesiology, Integral Institute of Medical Sciences and Research, Lucknow after taking approval from the institutional ethical committee.

Patients were informed about the drug used and procedure and written, informed consent were taken from all. ASA grade I and II patients between the age group of 20-60 years were included in the study. Exclusion criteria were ASA grade III, IV, V patients, patient with any significant medical condition and pregnant patients.

Patients were randomly allocated into two groups of 26 patients in each group. Group I patients received 12.5 mg 0.5% bupivacaine heavy with 5 µg dexmedetomidine and group II patients received 12.5 mg 0.5% bupivacaine heavy with 10 µg dexmedetomidine. Normal saline was added to make total volume of drug to 3 ml.

Patients were kept nil by mouth for 12 hours. On the day of surgery the patients were wheeled into operation theatre and all baseline parameters i.e. HR, NIBP, ECG recorded. All patients were premedicated with injection Ranitidine IV and Injection Ondansetron 8 mg IV. Preloading was done with Ringer lactate (15 ml/kg). Haemodynamic parameters were recorded after every 5 minutes for the first 15 minutes, then after every 15 minutes till three hours and then three hourly for the next 24 hours.. Subarchnoid block was given in sitting position at L3-L4 level and desired drug was given.

The sensory dermatome level was assessed by cold sensation using an alcohol swab along the mid-clavicular line bilaterally. The motor dermatome level was assessed according to the modified Bromage scale: 0-the patient is able to move the hip, 1-the patient is unable to move the hip but able to move the knee and ankle, 2- the patient is unable to move the hip & knee but is able to move the ankle, 3- the patient is unable to move the hip, knee and ankle [3]. The sensory level and Bromage scale were recorded every two minutes after the spinal injection upto the 10th minute and after that every 3 minutes until the highest dermatome was reached. All the durations were calculated considering the time of spinal injection as time zero. When the sensory level of anesthesia was not equal bilaterally, the higher level was used for statistical analysis. The patients were discharged after sensory regression to the S1 segment and Bromage scale of 0. The hypotension was defined as systolic blood pressure <90 mmHg and Bradycardia was defined as heart rate <50 beats/minute. Hypotension was treated by Injection Ephedrine (in aliquots of 6mg) and bradycardia was treated by Inj. Atropine 0.6 mg i.v.

Statistical Analysis

The results were presented in percentages and mean±SD. The dichotomous/categorical variables were compared by using Chi-square test. Unpaired t-test was used to compare the continuous variables between the groups. The p-value<0.05 was considered as significant. All the analysis was carried out by using SPSS 16.0 version.

RESULTS

Patients were comparable to each other in the terms of demographic profiles (Table 1).

The onset of sensory block (i.e. time taken to reach up T10 dermatome) was earlier in group II (3.9±1.5 min.) as compared to group I (6.9±1.7 min.) The difference was statistically significant (Table 2).

The onset of motor block was also significantly earlier in group II as compared to group I (9.1±2.5 Vs. 12.88 ± 3.1 min).

There was more time taken in regression of sensory block to

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S_1 dermatome in group II (311.6±34.5 Min) in comparison to group I (269.4±26.5 min.) 'p' <0.001.

Duration of motor block was also significantly prolonged (2.99±22.5 min in group II as compared to 221.81±19.2 in group I).

Significant hypotension and bradycardia was reported in none of the patients in either group (Table 3).

There was no significant difference in systolic blood pressure, diastolic blood pressure and heart rate of patients in both the group (fig 1,2,3).

DISCUSSION

Various intrathecal adjuvant to local anaesthetics has been used in the past to improve quality of intraoperative anaesthesia and postoperative analgesia. Some of these agents have additive advantage of providing sedation in the intraoperative period. They also shorten the onset of sensory and motor block, at the same time prolonging the duration [4,5,6].

In our study we noted that addition of dexmedetomidine to intrathecal bupivacaine reduced the onset of sensory and motor block and prolonged the duration in dose dependent manner. Hemodynamic instability was noted in none of the patients in either group.

Intrathecal dexmedetomidine when combined with spinal bupivacaine prolonges the sensory block by depressing the release of 'C' fibres transmitters and by hyperpolarization of post synaptic dorsal horn neuron [7,8]. Prolongation of motor block is seen due to binding of dexmedetomidine to motor neurons in the dorsal horn of spinal cord [9,10].

Similar to our study, Hala E. et al. opined that addition of 5 µg and 10 µg dexmedetomidine to intrathecal bupivacaine prolonged the analgesic effect of the drug in dose dependent manner.[11] The mean duration of analgesic achieved was 240 min with 5 µg dexmedetomidine and was 520 min with 10 µg . No hemodynamic instability or other side effects were noted in either group.

Joshi Rachana et al. studied effect of intrathecal bupivacaine dexmedetomidine combination on duration of subarachnoid block and postoperative analgesia. They observed that 5 µg dexmedetomidine is a good alternative as an adjuvant to spinal bupivacaine with minimal side effect and excellent postoperative analgesia .[12]

Rajni Gupta et al. compared intrathecal dexmedetomidine to intrathecal fentanyl as an adjuvant to intrathecal bupivacaine. They opined that intrathecal dexmedetomidine is associated with prolonged motor and sensory block, and hemodynamic stability and reduced demand for rescue analgesics in 24 hours as compared to fentanyl .[13]

CONCLUSION

The supplementation of dexmedetomidine to bupivacaine reduces the onset and prolongs the duration of motor and sensory block significantly.

Table-1: Demographic profile of the patients

Demographic profile	Group I (n=26)	Group II (n=26)	p-value[1]
Age in years	56.70±12.34	57.46±11.24	0.81
Gender			
Male	17 (65.3%)	19 (73.0%)	0.54
Female	9 (34.7%)	7 (27.0%)	
Body Mass Index	27.67±3.46	27.89±4.56	0.84
Asia grade			
I	4	5	0.76
II	16	17	
III	6	4	

[1]Unpaired t-test, values are in mean±SD and percentages

Table-2: Block onset and regression times in minutes

Characteristics of spinal blocks	Group I (n=26)	Group II (n=26)	p-value[1]
Sensory block to reach T10 dermatome (min)	6.9±1.7	3.9±1.5	<0.001*
Motor block to reach Bromage 3 (min)	12.88±3.1	9.1±2.5	<0.001*
Sensory regression S1 segment (min)	269.4±26.5	311.6±34.5	<0.001*
Motor block regression to Bromage 0 (min)	221.8±19.2	299.1±22.5	<0.001*

[1]Unpaired t-test, values are in mean±SD, *Significant

Table-3: Surgical characteristics, adverse effect and treatment

Characteristics of spinal blocks	Group I (n=26)	Group II (n=26)	p-value
Total intraveneously infusion (ml)	984.3±102.4	1011.6±109.1	0.35[1]
Duration of surgery (in minutes)	48.4±12.3	50.4±14.5	0.59[1]
Blood transfusion	1	2	0.55[2]
Additive analgesia	2	0	0.14[2]
Nausea/Vomiting	0	1	0.31[2]
Bradycardia	0	0	NA
Hypotension	0	0	NA
Atropine	0	0	NA
Ephedrine	0	0	NA

[1]Unpaired t-test, [2]Chi-square test, NA-Not applicable

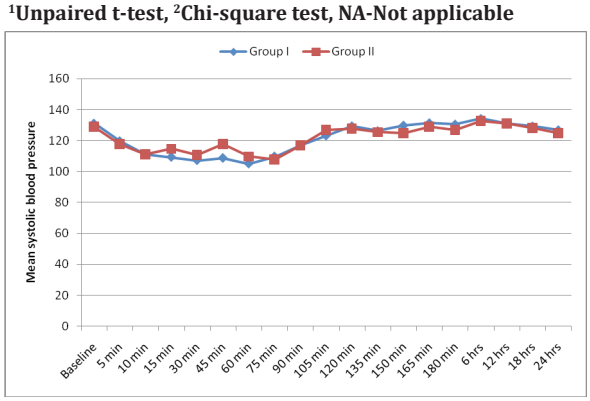


Fig.1: Changes in systolic blood pressure

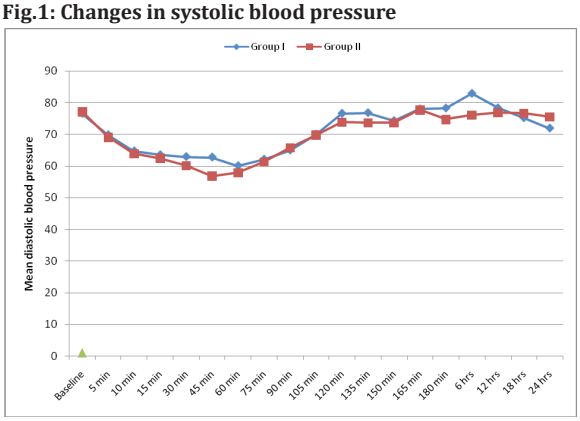


Fig.2: Changes in diastolic blood pressure

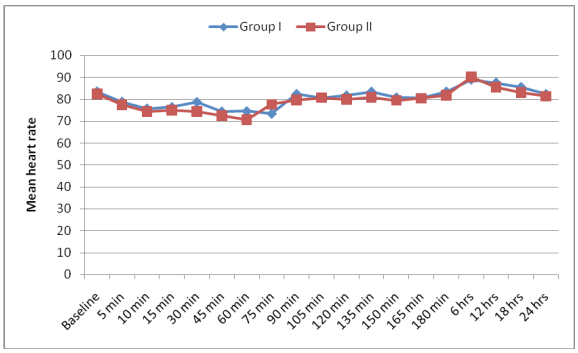


Fig.3: Changes in heart rate

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